EOSDIS Core System Project

Release B Maintainability Predictions for the ECS Project

March 1996

Hughes Information Technology Systems
Upper Marlboro, Maryland

Release B Maintainability Predictions
for the ECS Project

March 1996

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CDRL Item #091

APPROVED BY

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Upper Marlboro, Maryland

518-CD-002-002

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Preface

This document is a contract deliverable with an approval code of 3. This document is delivered to NASA for information only, but is subject to approval as meeting contractual requirements.

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Abstract

This Maintainability Predictions report (CDRL 91, DID 518) presents Commercial-Off-The-Shelf (COTS) vendors predicted and actual field mean-time-to-repair (MTTR) data for all ECS hardware configuration items (HWCIs) which are presented at the Release B Critical Design Review (CDR). These MTTRs are required to support the availability modeling task in which the results are documented in CDRL 88, DID 515.

Keywords: maintainability,availability, prediction, MTTR, MDT, worksheet, maintenance, BIT, repair, GFE

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1. Introduction

1.1 Identification of Document

This Maintainability Predictions Report, Contract Data Requirements List (CDRL) item 091, whose requirements are specified in Data Item Description (DID) 518/PA3, is a required deliverable under the Earth Observing System Data and Information System (EOSDIS) Core System (ECS), Contract (NAS5-60000).

1.2 Scope of Document

This report incorporates Government's comments received by the Data Management Office (DMO) on December 6, 1995 in the technical letter No. 995-TR-951-175. This report also provides updates to the Release B Incremental Design Review (IDR) submittal which was generated at the ECS Release B IDR time frame.

The purpose of this submittal is to reflect the current ECS architecture and to present detailed predicted and operational MTTRs (Mean Time To Repair) of the proposed ECS hardware configuration items (HWCIs) presented at the Release B Critical Design Review (CDR) time frame. These HWCI's MTTRs are provided by the commercial-off-the shelf (COTS) vendors and are reviewed for accuracy by the ECS reliability and hardware procurement organizations. The applicable Distributed Active Archive Center (DAAC) sites for the Release B SDPS and CSMS are: Goddard Space Flight Center (GSFC), Earth Resources Observation System (EROS) Data Center (EDC), Langley Research Center (LaRC), Jet Propulsion Laboratory (JPL), National Snow and Ice Data Center (NSIDC), Oak Ridge National Laboratory (ORNL), and Alaska Synthetic Aperture Radar (SAR) Facility (ASF).

The report also presents the maintainability prediction methodology, ground rules and assumptions in accordance with MIL-HDBK-472, Prediction Procedure II, which are required when specific COTS vendor data or comparable vendor data is not available.

This document reflects the February 14, 1996 Technical Baseline maintained by the ECS Configuration Control Board in accordance with the ECS Technical Direction No.11, dated December 6, 1994.

1.3 Purpose and Objectives of Document

The Maintainability Predictions report provides the ECS predicted hardware maintainability data to support the availability modeling activity which was documented in DID #515/PA2, Availability Models/Predictions. The Maintainability prediction is a continuous and iterative process throughout the program life cycle to ensure that the ECS system will achieve its functional availability requirements. This task is performed early in the design process or once hardware is identified, in order to be an effective aid in evaluating the ECS design by providing

information that can be used as the basis for design decisions such as redundancy, fault management design approach, accessibility to facilitate repair, and hot switchable LRUs.

The maintainability prediction procedure highlights for the designer, those areas of poor maintainability which justify product improvement, modification, or a change of design. It also permits the user to make an early assessment of whether the predicted downtime, quality and quantity of personnel, tools and test equipment are adequate and consistent with the needs of system availability requirements.

Results from this report will be used to serve as inputs for determining life cycle costs, sparing requirements, maintenance planning, and the development of the availability models/predictions report.

1.4 Document Status and Schedule

This submittal of DID 518/PA3 meets the milestone specified in the Contract Data Requirements List (CDRL) of NASA contract NAS5-60000. It is anticipated that this submittal will be reviewed during the Release B Critical Design Review (CDR), and that subsequent changes to the document will be incorporated into a resubmittal to be delivered two weeks after receiving comments from the customer.

Subsequent maintainability prediction updates for each release configuration will be submitted at each release Incremental Design Review (IDR), CDR, and throughout the ECS life cycle.

1.5 Document Organization

The document is organized into five (5) sections and one Appendix:

Section 1   Introduction, contains the identification, scope, purpose and objectives, status and schedule, and document organization.

Section 2   Related Documentation, provides a bibliography of parent, applicable and information documents for the Maintainability Predictions.

Section 3   ECS Maintainability Predictions Methodology, describes the maintainability requirements, vendor data, prediction technique, assumptions and ground rules, and prediction worksheets.

Section 4   Other MTTR Data Sources, describes GFE provided data.

Section 5   Maintainability Prediction Data, describes the maintainability data for the FOS, SDPS, and CSMS.

Appendix A   Maintainability Data, provides detailed spreadsheets divided into two sections; one for FOS and one for SDPS and CSMS hardware.

2. Related Documentation

2.1 Parent Documents

The parent documents are the documents from which this Maintainability Predictions document scope and content are derived.

194-207-SE1-001   Systems Design Specification for the ECS Project

420-05-03   Goddard Space Flight Center, Earth Observing System (EOS) Performance Assurance Requirements for the EOSDIS Core System (ECS)

423-41-01   Goddard Space Flight Center, EOSDIS Core System Statement of Work

423-41-02   Goddard Space Flight Center, Functional and Performance Requirements Specification for the Earth Observing System Data and Information System (EOSDIS) Core System

423-41-03   Goddard Space Flight Center, EOSDIS Core System Contract Data Requirement Document

2.2 Applicable Documents

The following documents are referenced within this Maintainability Predictions document, or are directly applicable, or contain policies or other directive matters that are binding upon the content of this volume.

194-501-PA1-002   Performance Assurance Implementation Plan for the ECS Project

194-502-PA1-001   Contractor's Practices & Procedures Referenced in the PAIP for the ECS Project

210-TP-001-006   Techinical Baseline for the ECS Project

515-CD-002-002   Release B Availability Models/Predictions for the ECS Project

516-CD-002-002   Release B Reliability Predictions for the ECS Project

613-CD-002-001   Release A COTS Maintenance Plan for the ECS Project

MIL-HDBK-472   Department of Defense Military Handbook: Maintainability Predictions

2.3 Information Documents

The following documents, although not referenced herein and/or not directly applicable, do amplify or clarify the information presented in this document. These documents are not binding on the content of the Maintainability Predictions document.

MIL-STD-470B   Department of Defense Military Standard: Maintainability Program for Systems and Equipment

3. ECS Maintainability Predictions Methodology

3.1 Maintainability Prediction Requirements

The ECS design uses state-of-the-art COTS hardware to meet requirements and take advantage of the rapidly evolving technology; therefore, the primary source for maintainability data is COTS vendor supplied data.

Maintainability Predictions are required to support the Availability Modeling/Prediction activity (DID 515/PA2). The maintainability data supporting the maintainability predictions will be obtained or developed in the following order of priority in accordance with the ECS performance requirements of paragraph 5.4.2 in document 420-05-03:

1) COTS vendor supplied maintainability data will be utilized at the purchased hardware unit level. If this data is unavailable;

2) Historical or comparable data for like hardware items using similar technologies and construction/packaging will be utilized. If this data is unavailable;

3) A Maintainability Prediction will be performed on the hardware per MIL-HDBK-472, Prediction Procedure II. This maintainability prediction will use equipment drawings as well as a list of standard equipment repair times provided by the COTS vendors.

3.2 COTS Vendor Data

All COTS vendors will be required to provide maintainability values down to the line-replaceable-unit (LRU) level with their identified source. Maintainability data sources can be either of the following:

   a. Field service data,

   b. Test data,

   c. Predicted data.

Vendor maintainability data will be collected by the ECS M&O (Maintenance and Operations) group as part of the procurement process. ECS Systems Maintainability engineers will participate in this process to ensure the validation and integrity of the maintainability data. This process is detailed in document 194-502-PA1-001, Contractor's Practices & Procedures Referenced in the PAIP for the ECS Project, project instruction RM-1-002, Control of COTS Subcontractors and Suppliers. Figure 3.2-1 presents the COTS vendor maintainability data flow process for the ECS program. This data will first be recorded in the Integrated Logistic System (ILS) database called Vendor Costing And Tracking System (VCATS). The Systems Engineering group will then receive a report identifying the hardware description, vendor, and maintainability data. This data is then used as the basis for the maintainability predictions (MTTR values) for each segment and is shown in Appendix A.1 for FOS and Appendix A.2 for SDPS and CSMS with detailed explanations in Section 5.0. If vendor data on specific COTS

products is not available, historical or comparable data for like hardware using similar technology in similar environments will be utilized if available and acceptable. In the case where vendor, historical or comparable maintainability data is unavailable, COTS vendor equipment drawings as well as the vendor's list of standard equipment repair times will be requested. Maintainability prediction worksheets will be generated and their outputs will become part of the Maintainability Predictions Report.
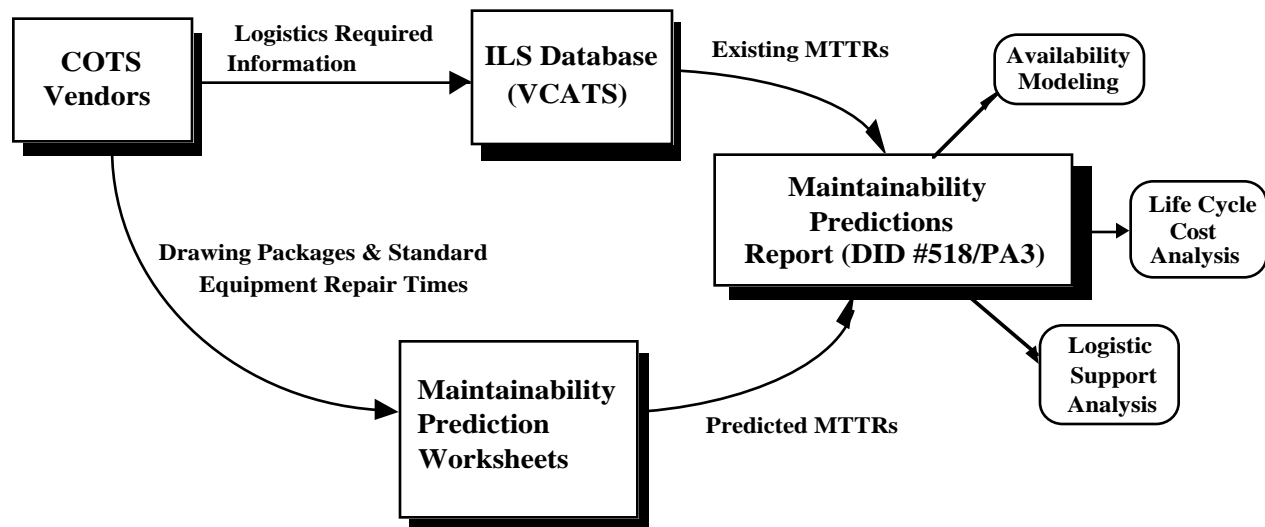
Figure 3.2-1. COTS Vendor Maintainability Data Flow Process

3.3 Maintainability Prediction Technique of MIL-HDBK-472, Procedure II

If vendor maintainability data is unavailable and no historical or comparable data is available for like items using similar technologies and construction/packaging, a maintainability calculation will be made using the methodology defined in MIL-HDBK-472, Procedure II. The general mathematical expression for equipment MTTR using this method is:

$$MTTR = \frac{\sum_{i=1}^{n} \lambda_i M_{c_i}}{\sum_{i=1}^{n} \lambda_i}$$

$\lambda_i = i^{th}$ Subassembly or Line Replaceable Unit (LRU) failure rate in failures per million hours

$M_{c_i} = i^{th}$ LRUs corrective maintenance repair time in hours

n = total number of LRUs

$MTTR$ = Mean Time To Repair in hours

The value for M_C will be calculated using the Maintainability Prediction Worksheets described in Section 3.5.

3.4 Assumptions and Ground Rules

The following are assumptions and ground rules for the ECS maintainability predictions in accordance with MIL-HDBK-472, Prediction Procedure II:

1) Maintainability predictions will be performed using the LRU level data. All maintenance task times associated with the LRUs will be listed on the maintainability prediction worksheet (Figure 3.5-1) in conjunction with their failure rates (derived from the MTBF values in the Reliability Predictions document, DID 516/PA2) to produce the MTTR results.

2) The Maintainability Prediction will be based on corrective maintenance task times. Corrective maintenance is the maintenance performed to restore an item to a satisfactory condition by providing correction of a malfunction which has caused degradation of the item below its specified performance level.

3) Corrective maintenance times include only actual repair time which is the period when repair work is in progress. Therefore, it excludes such parameters of measure as administrative time or logistic time, etc.

4) The Preventive Maintainability task times will be taken into consideration by the ILS group for scheduling and manpower requirements. Preventive maintenance is the maintenance performed to retain an item in satisfactory operational condition by providing systematic inspection, detection, and prevention of incipient failures. Preventive maintenance can be either scheduled or unscheduled depending upon the requirements of the mission.

5) The Administrative Logistics Delay Time (ALDT) will be determined based on each site's maintenance concept documented in the ECS COTS Maintenance Plan, 613-CD-001-002, and on the individual hardware. For prediction purposes the average estimated Administrative Logistics Delay Time (ALDT) is four (4) hours. The MDT value is used to calculate the required functional availabilities which are documented in the Availability Models/Predictions Report, 515-CD-002-002.

3.5 MTTR Calculation Worksheets

The ECS maintainability prediction method described in this document depends upon utilizing the estimated Maintenance Task Times required for performing the specific maintenance tasks which, in total, comprise a repair or maintenance action. These Maintenance Task Times are part of the Maintainability Prediction Worksheet as shown in Figure 3.5-1.

System_____   Page___Of____
Segment_____   Date_____
Element/Function_____   Prepared By_____
                                                                                Approved By_____
[------------------------------------Maintenance Task Times--------------------------------------]

LRU Description	LRU Part Number	Failure Rate (λ)	Localization	Isolation	Disassembly	Interchange	Reassembly	Alignment	Checkout	Repair Time (M_C)	Failure Rate x Repair Time (λM_C)
	$\Sigma\lambda=$									$\Sigma\lambda M_C=$	

Figure 3.5-1. Maintainability Prediction Worksheet

The Maintainability Prediction worksheet is completed for each piece of hardware requiring a predicted MTTR. The hardware is broken down into LRUs. Each LRU is entered into a row in the worksheet. The LRUs failure rate (λ) is taken from the Reliability Predictions document, DID 516/PA2. The Maintenance Task Times are then entered in hours.

The following are descriptions of the seven Maintenance Tasks Times:

    a. <u>Localization</u> - Determining the location of a failure to the extend possible, with the assistance of Built-In-Test (BIT) capability but without using accessory equipment.

    b. <u>Isolation</u> - Determining the location of a failure to the extend possible, with the assistance of Built-In-Test (BIT) capability and by the use of accessory test equipment.

    c. <u>Disassembly</u> - Equipment disassembly to the extent necessary, to gain access to the item that is to be replaced.

d. <u>Interchange</u> - Removing the defective item and installing the replacement.

e. <u>Reassembly</u> - Closing and reassembling of the equipment after the replacement has been made.

f. <u>Alignment</u> - Performing any alignment, minimum tests and/or adjustment made necessary by the repair action.

g. <u>Check Out</u> - Performing checks or tests required to verify that the equipment has been restored to satisfactory performance.

The calculations made in the Maintainability Prediction Worksheet in Figure 3.5-1 are as follows:

1) The sum of the Maintenance Task Times equals the Repair Time (M_c).

2) The Repair Time (M_c) is multiplied by the failure rate (λ) of the LRU, expressed in failures per million hours (FPMH), to obtain an estimate of the number of maintenance hours (λM_c) for that specific maintenance or repair action.

3) The maintenance hours are summed ($\sum \lambda M_c$).

4) The failure rates are summed ($\sum \lambda$).

5) The MTTR is calculated by dividing the summed maintenance hours by the summed failure rates ($\sum \lambda M_c / \sum \lambda$).

The equation used for this calculation was defined earlier in Section 3.3. The MTTRs for each piece of hardware is shown in Appendix A.1 for FOS and A.2 for SDPS and CSMS.

The Appendices are explained in Section 5.0.

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4. Other MTTR Data Sources

4.1 Government Furnished Equipment (GFE) Provided Data

Since all required RMA functional hardware strings within the DAACs consist of COTS equipment, a GFE provided data list is not required for these functions.

For the inter-DAAC required function (EOSD3990: SDPS Function of Data Order Submission Across DAACs), a GFE list will be requested and incorporated by the EBNet provider. ECS Reliability Engineering group will ensure that quantitative RMA requirements are appropriately specified for the network by the EBNet provider, by reviewing its requirements, so that the overall functional requirement can be achieved.

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5. Maintainability Prediction Data

The maintainability data presented in Appendix A is divided into two sections. The first section A.1 contains FOS maintainability data, the second section A.2 contains SDPS and CSMS maintainability data.

The definition for each worksheet column follows:

Column Title	Description
Site	Physical location of hardware
HWCI	Hardware Configuration Item within the Segment
Rel	Release in which hardware is delivered
Qty	Number of items used in this subsystem
Item Description	Hardware name and/or description
Model	Manufacturer model number of hardware
MTTR	Mean Time To Repair
Data Source	Source of MTTR data. (i.e. Vendor, Maintainability Prediction, Similar to..., etc.)

5.1 Flight Operations Segment (FOS) Maintainability Prediction Data

Appendix A.1 presents the detailed listings of the FOS hardware for Release B at GSFC with their associated MTTRs. These MTTRs are predicted and/or field return maintainability data which were provided by the COTS vendors. The hardware models in Appendix A.1 are selected hardware candidates for Release B which were presented at the FOS CDR time frame. The data in Appendix A.1 remains unchanged from the previous submittal.

5.2 Science Data Processing Segment (SDPS) and Communications and System Management Segment (CSMS) Maintainability Prediction Data

Appendix A.2 presents the detailed listings of the SDPS and CSMS hardware for Release B at GSFC, LaRC, EDC, NSIDC, JPL, ORNL, and ASF DAAC sites with their associated MTTRs. These MTTRs are predicted and/or field return maintainability data which were provided by the COTS vendors. As the SDPS design evolves, any changes to the hardware list will be updated with latest vendor's MTTR data.

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Appendix A. Detailed MTTR Prediction Data

A.1 Flight Operations Segment (FOS) Maintainability Prediction Data

FOS COTS Hardware RMA Data For Release B

Site	HWCI	Rel.	Qty	Item Description	Model	MTTR (Hours)	Data Source
GSFC	EOC-SRV	B	3	Real Time Server: 256MB,2GB,CDROM, 4mm DAT, Dual FDDI Card	DEC Alpha 1000 4/233	.60	Vendor pred.
GSFC	EOC-SRV	B	3	Data Server:256MB,2GB,CDROM, 4mm DAT, Dual FDDI Card	DEC Alpha 1000 4/233	.60	Vendor pred.
GSFC	EOC-WS	B	36	FOT WorkStation: 64MB,2GB, CD ROM, 2 Ethernet Cards, 21" monitor	SUN Sparc20 Model 71	.60	Vendor pred.
GSFC	EOC-T-SRV	B	2	Time System and Rack	TYMESERV2000 IRIG	.50	Vendor pred.
GSFC	EOC-RAID	B	2	Operational RAID File Server: 128MB, 2GB,CDROM, 4mm DAT, Dual FDDI Card	DEC Alpha 1000 4/233	.60	Vendor pred.
GSFC	EOC-RAID	B	1	Operational RAID 5 Unit: 60 GB	DEC Storage Works	.50	Vendor pred.
GSFC	EOC-SRV	B	1	Multicast Server: 64MB,2GB, CD ROM, 2 Ethernet Cards, 21" monitor	SUN Sparc20 Model 71	.60	Vendor pred.
GSFC	EOC-LSM SRV	B	2	Local System Mgr. Server: 128MB,2GB, CD ROM, 2 Ethernet Cards, 21" monitor	HP J210	2.60	Similar
GSFC	EOC-SUP RAID	B	2	Support RAID File Server: 128MB, 2GB,CDROM, 4mm DAT, Dual FDDI Card	DEC Alpha 1000 4/233	.60	Vendor pred.
GSFC	EOC-SUP RAID	B	1	Support RAID 5 Unit: 12GB	DEC Storage Works	.50	Vendor pred.
GSFC	EOC	B	7	Laser Printer	HP Laser Jet 4M	1.50	Vendor pred.
GSFC	EOC	B	5	Color Printer	HP Laser Jet	1.00	Vendor pred.
GSFC	EOC	B	12	20-Inch Color Monitor GX	SUN Monitor	.50	Vendor pred.
GSFC	EOC	B	12	FDDI CONCENTRATOR	FDDI Concentr.	0.5	Vendor pred.
GSFC	EOC	B	1	ETHERNET HUB	Ethernet Hub	0.5	Vendor pred.

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A.2 Science Data Processing Segment (SDPS) and Communications and System Management (CSMS) Maintainability Prediction Data

SDPS and CSMS COTS Hardware RMA Data For Release B (1 of 19)

Site	HWCI	Rel.	Qty	Item Description	Model	MTTR (Hours)	Data Source
LARC	ACM	B	2	APC SERVER	SGI Challenge L, 4 CPU, 256 MB RAM, 4 GB	1.5	Vendor pred.
LARC	ACM	B	1	RAID DISK	340 GB	0.5	Vendor pred.
LARC	ACM	B	1	TAPE LIBRARY	STK Wolfcreek ATL	1.0	Vendor pred.
LARC	ACM	B	8	LIBRARY DRIVES	D3 Tape Drives	0.5	Vendor pred.
LARC	ACM	B	2	OPS WORKSTATION	Sun Sparc 20/50, 64 MB RAM, 4 GB	0.5	Vendor pred.
LARC	AQA	B	1	QA WORKSTATION	SGI Indigo2 XZ, 256 MB RAM, 10 GB	1.0	Vendor pred.
LARC	AQA	B	1	RAID	17 GB RAID	0.5	Vendor pred.
LARC	AIT	B	1	AIT WORKSTATION	Sun Sparc 20/712, 256 MB RAM, 6 GB	1.0	Vendor pred.
LARC	AIT	B	2	AIT WORKSTATION	Sun Sparc 20/50, 64 MB RAM, 6 GB	0.5	Vendor pred.
LARC	AIT	B	1	AIT WORKSTATION	Sun Sparc 20/50, 64 MB RAM, 8 GB	0.5	Vendor pred.
LARC	AIT	B	2	PRINTER	HP LaserJet 4M+, 12ppm, 14 MB	1.5	Vendor pred.
LARC	AIT	B	7	X TERMINAL	X TERMINAL, NCD HMX Pro, 16 MB RAM	0.5	Vendor pred.
LARC	DIP	B	3	DISTRIBUTION SERVER	SUN Sparc 20/712, 256 MB RAM, 6 GB	1.0	Vendor pred.
LARC	DIP	B	1	RAID DISK	240 GB	0.5	Vendor pred.
LARC	DIP	B	1	TAPE STACKER	3, 8mm Drives w/stacker - Exabyte	0.3	Vendor pred.
LARC	DIP	B	1	TAPE STACKER	3, 4mm Drives w/stacker - Exabyte	0.5	Vendor pred.
LARC	DIP	B	1	CD ROM	CD ROM, Recordable, JVC	0.5	Vendor pred.
LARC	DIP	B	1	FAX/SCANNER	FAX/SCANNER	0.5	Vendor pred.
LARC	DIP	B	1	TAPE DRIVE	3480/3490 TAPE DRIVE	0.5	Vendor pred.

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Site	HWCI	Rel.	Qty	Item Description	Model	MTTR (Hours)	Data Source
LARC	DIP	B	1	TAPE DRIVE	6250 BPI Tape Drive	1.0	Vendor pred.
LARC	DIP	B	2	PRINTER	HP LaserJet 4M+, 12 ppm, 14 MB	1.5	Vendor pred.
LARC	DMG	B	1	DMG SERVER	K400, (redundant CPU & power supplies)	2.7	Vendor pred.
LARC	DMG	B	1	RAID DISK	HP 10 GB	0.5	Vendor pred.
LARC	DMG	B	3	DATA SPECIALIST WORKSTATION	SUN Sparc 20/50, 64 MB RAM, 6 GB	0.5	Vendor pred.
LARC	DMG	B	1	DBA OPS WORKSTATION	HP 715/64, 64 MB RAM, 6 GB	1.0	Vendor pred.
LARC	DRP	B	2	FSMS SERVER	SGI Challenge XL, 4 CPU, 512 MB RAM, 6 GB	1.5	Vendor pred.
LARC	DRP	B	1	RAID DISK	85 GB	0.5	Vendor pred.
LARC	DRP	B	2	ARCHIVE ROBOTICS	EMASS AML, Model 2, Tall Quadro Tower, 2 Arms)	1.0	Vendor pred.
LARC	DRP	B	20	TAPE DRIVE	3590 Tape Drive (10 each per archive robotics)	1.0	Vendor pred.
LARC	DRP	B	2	DBMS SERVER	SGI Challenge XL, 2 CPU, 256 MB RAM, 6 GB	1.5	Vendor pred.
LARC	DRP	B	1	RAID DISK	10 GB	0.5	Vendor pred.
LARC	DDS	B	2	DOCUMENT SERVER	SUN Sparcstation 20/712, 256MB, 6GB	1.0	Vendor pred.
LARC	ICL	B	1	RAID	SGI 102 GB RAID	0.5	Vendor pred.
LARC	ICL	B	2	8MM TP STACKER W/3 DR	8mm Drive w/stacker - EXABYTE 210	0.3	Vendor pred.
LARC	ICL	B	2	INGEST SERVER	SGI Challenge L, 4 CPU, 256MB, 6GB,FDDI	1.5	Vendor pred.
LARC	ICL	B	1	X TERMINAL	X TERMINAL, NCD HMX Pro, 16 MB RAM	0.5	Vendor pred.
LARC	ICL	B	1	ARCHIVE ROBOTICS	ARCHIVE ROBOTICS - 1 Tower, 1 Arm	1.0	Vendor pred.
LARC	ICL	B	2	LINEAR MAG DR	NTP Linear Tape Drive, 3590	1.0	Vendor pred.
LARC	ICL	B	1	INGEST SERVER	SGI Indigo2, 256 MB RAM, 6 GB	1.0	Vendor pred.

SDPS AND CSMS COTS Hardware RMA Data For Release B (3 of 19)

Site	HWCI	Rel.	Qty	Item Description	Model	MTTR (Hours)	Data Source
LARC	ICL	B	1	INGEST SERVER	SGI Challenge DM, 256 MB RAM, 4 GB	1.5	Vendor pred.
LARC	PLAN	B	2	PDPS DBMS SERVER	SUN Sparc 20/712, 512 MB RAM, 6 GB	1.0	Vendor pred.
LARC	PLAN	B	4	DISK	Sparcstorage Multipack 6.3 GB (2 each per server)	0.5	Vendor pred.
LARC	SPR	B	1	SCIENCE PROCESSOR	SGI Power Challenge XL, 20 CPU, 2 GB RAM, 12 GB, HiPPI	1.5	Vendor pred.
LARC	SPR	B	2	RAID DISK	SGI 144 GB	0.5	Vendor pred.
LARC	SPR	B	1	TAPE STACKER	3, 8mm Drives w/stacker - Exabyte	0.3	Vendor pred.
LARC	SPR	B	1	TAPE STACKER	3, 4mm Drives w/stacker - Exabyte	0.5	Vendor pred.
LARC	SPR	B	5	X TERMINAL	X TERMINAL, NCD HMX Pro, 16 MB RAM	0.5	Vendor pred.
LARC	SPR	B	1	SCIENCE PROCESSOR	SGI Power Challenge XL, 12 CPU, 2 GB RAM, 12 GB, HiPPI, 4mm	1.5	Vendor pred.
LARC	SPR	B	1	RAID	SGI 68 GB	0.5	Vendor pred.
LARC	SPR	B	1	SCIENCE PROCESSOR	SGI Power Challenge XL, 18 CPU, 2 GB RAM, 12 GB, HiPPI	1.5	Vendor pred.
LARC	SPR	B	1	RAID	SGI 102 GB	0.5	Vendor pred.
LARC	SPR	B	1	SCIENCE PROCESSOR	SGI Power Challenge XL, 20 CPU, 2 GB RAM, 18 GB, HiPPI	1.5	Vendor pred.
LARC	SPR	B	1	RAID	SGI 432 GB	0.5	Vendor pred.
LARC	SPR	B	1	SCIENCE PROCESSOR	SGI Power Challenge XL, 16 CPU, 2 GB RAM, 18 GB, HiPPI	1.5	Vendor pred.
LARC	SPR	B	1	RAID	SGI 144 GB	0.5	Vendor pred.
LARC	SPR	B	1	SCIENCE PROCESSOR	SGI Power Challenge XL, 16 CPU, 2 GB RAM, 18 GB, HiPPI	1.5	Vendor pred.
LARC	SPR	B	1	RAID	SGI 144 GB	0.5	Vendor pred.
LARC	SPR	B	2	QUEUING SERVER	SUN Sparc 20/712, 512 MB RAM, 6 GB	1.0	Vendor pred.
LARC	SPR	B	4	DISK	Sparcstorage Multipack 6.3 GB (2 each per server)	0.5	Vendor pred.

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SDPS AND CSMS COTS Hardware RMA Data For Release B (4 of 19)

Site	HWCI	Rel.	Qty	Item Description	Model	MTTR (Hours)	Data Source
LARC	WKS	B	2	WKS HOST	SGI Challenge L, 4 CPU, 256 MB RAM, 4 GB	1.5	Vendor pred.
LARC	WKS	B	1	RAID DISK	SGI 62 GB	0.5	Vendor pred.
LARC	WKS	B	1	TAPE LIBRARY	STK Wolfcreek ATL	1.0	Vendor pred.
LARC	WKS	B	6	LIBRARY DRIVES	D3 TAPE DRIVES	0.5	Vendor pred.
LARC	CSS	B	1	CSS SERVER	HP J210, 4 CPU, 256 MB, 4 GB	2.6	Vendor pred.
LARC	MSS	B	1	MSS SERVER	HP J210, 4 CPU, 256 MB, 4 GB	2.6	Vendor pred.
LARC	MSS	B	1	RAID	HP 36 GB RAID	0.5	Vendor pred.
LARC	MSS	B	1	MSS BACKUP SERVER	SUN Ultra 4-slot, 256 MB RAM, 4 GB	0.5	Vendor pred.
LARC	MSS	B	1	TAPE STACKER	DLT Stacker	0.5	Vendor pred.
LARC	MSS	B	1	MSS WS	SUN Sparcstation 20/50, 128 MB, 4GB	0.5	Vendor pred.
LARC	MSS	B	1	MSS WS	SUN Sparcstation 20/50, 128 MB, 10GB	0.5	Vendor pred.
LARC	MSS	B	1	MSS WS	SUN Sparc 20/712, 256 MB RAM, 6 GB	1.0	Vendor pred.
LARC	MSS	B	1	LASER PRINTER	HP LaserJet 4M +, 12ppm, 14MB RAM	1.5	Vendor pred.
LARC	ISS	B	12	FDDI CONCENTRATOR	FDDI Concentrator - Bay Networks 2914-04	0.5	Vendor pred.
LARC	ISS	B	1	FDDI SWITCH	PowerHub7000 - ALANTEC (4 FDDI cards & 3 power supplies)	0.5	Vendor pred.
LARC	ISS	B	1	ETHERNET HUB	Ethernet Hub - Cabletron MicroMAC-22E w/BRIM-F6	0.5	Vendor pred.
LARC	ISS	B	1	HPPI SWITCH	HPPI SWITCH	0.5	Vendor pred.
LARC	ISS	B	1	FIDDI ROUTER	FIDDI ROUTER	0.5	Vendor pred.
NSIDC	ACM	B	2	ACM HOST	SGI Challenge L, 4 CPU, 512 MB RAM, 6 GB	1.5	Vendor pred.
NSIDC	ACM	B	2	RAID DISK	108 GB	0.5	Vendor pred.

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SDPS AND CSMS COTS Hardware RMA Data For Release B (5 of 19)

Site	HWCI	Rel.	Qty	Item Description	Model	MTTR (Hours)	Data Source
NSIDC	ACM	B	2	OPS WORKSTATION	SUN Ultra 140, 64 MB RAM, 4 GB	0.5	Vendor pred.
NSIDC	ACM	B	1	TAPE LIBRARY	STK Wolfcreek ATL	1.0	Vendor pred.
NSIDC	ACM	B	8	LIBRARY DRIVES	D3 Tape Drives	0.5	Vendor pred.
NSIDC	DIP	B	2	DISTRIBUTION SERVER	SUN Sparc 20/712, 256 MB RAM, 6 GB	1.0	Vendor pred.
NSIDC	DIP	B	1	RAID DISK	210 GB	0.5	Vendor pred.
NSIDC	DIP	B	1	TAPE STACKER	3, 8mm Drives w/stacker - Exabyte	0.3	Vendor pred.
NSIDC	DIP	B	1	TAPE STACKER	3, 4mm Drives w/stacker - Exabyte	0.5	Vendor pred.
NSIDC	DIP	B	1	CD ROM	CD ROM, Recordable, JVC	0.5	Vendor pred.
NSIDC	DIP	B	1	FAX/SCANNER	FAX/SCANNER	0.5	Vendor pred.
NSIDC	DIP	B	1	TAPE DRIVE	3480/3490 TAPE DRIVE	0.5	Vendor pred.
NSIDC	DIP	B	1	TAPE DRIVE	6250 BPI Tape Drive	1.0	Vendor pred.
NSIDC	DIP	B	2	PRINTER	HP LaserJet 4M+, 12 ppm, 14 MB	1.5	Vendor pred.
NSIDC	DMG	B	1	DMG SERVER	K400, (redundant CPU & power supplies)	2.7	Vendor pred.
NSIDC	DMG	B	1	RAID DISK	HP 10 GB	0.5	Vendor pred.
NSIDC	DMG	B	1	DBA OPS WORKSTATION	HP C100, 64 MB RAM, 6 GB	2.5	Vendor pred.
NSIDC	DMG	B	2	DATA SPECIALIST WORKSTATION	SUN Ultra 140, 64 MB RAM, 6 GB	0.5	Vendor pred.
NSIDC	DRP	B	2	FSMS SERVER	SGI Challenge L, 2 CPU, 256 MB RAM, 12 GB	1.5	Vendor pred.
NSIDC	DRP	B	1	ARCHIVE ROBOTICS	STK Powderhorn ATL	1.0	Vendor pred.
NSIDC	DRP	B	6	TAPE DRIVE	3590 Tape Drive	1.0	Vendor pred.
NSIDC	DRP	B	2	DBMS SERVER	SGI Challenge DM, 2 CPU, 256 MB RAM, 4 GB	1.5	Vendor pred.

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SDPS AND CSMS COTS Hardware RMA Data For Release B (6 of 19)

Site	HWCI	Rel.	Qty	Item Description	Model	MTTR (Hours)	Data Source
NSIDC	DRP	B	1	DISK	17 GB	0.5	Vendor pred.
NSIDC	DDS	B	2	DOCUMENT SERVER	SUN Ultra 4-slot, 2 CPU, 256 MB RAM, 6 GB	0.5	Vendor pred.
NSIDC	DDS	B	1	DISK	6 GB	0.5	Vendor pred.
NSIDC	PLAN	B	1	PDPS DBMS SERVER	SUN Ultra 8-slot, 2 CPUs, 512 MB RAM, 6 GB	0.5	Vendor pred.
NSIDC	PLAN	B	2	DISK	Sparcstorage Multipack 8.4 GB (2 per server)	0.5	Vendor pred.
NSIDC	PLAN	B	2	PROD PLANNING/MGMT W/S	SUN Sparc 20/71, 512 MB RAM, 6 GB	0.8	Vendor pred.
NSIDC	SPR	B	1	AI&T PROCESSOR	SGI Power Challenge L, 4 CPU, 512 MB RAM, 4 GB	1.5	Vendor pred.
NSIDC	SPR	B	1	RAID DISK	SGI 17 GB	0.5	Vendor pred.
NSIDC	SPR	B	1	TAPE STACKER	3, 8mm Drives w/stacker - Exabyte	0.3	Vendor pred.
NSIDC	SPR	B	1	AI&T/AQA PROCESSOR	SGI Indigo2 Impact, 2 CPU, 128 MB RAM, 4 GB	1.0	Vendor pred.
NSIDC	SPR	B	1	RAID	SGI 17 GB	0.5	Vendor pred.
NSIDC	SPR	B	1	QUEUING SERVER	SUN Ultra 8-slot, 2 CPUs, 512 MB RAM, 6 GB	0.5	Vendor pred.
NSIDC	SPR	B	2	DISK	Sparcstorage Multipack 8.4 GB (2 per server)	0.5	Vendor pred.
NSIDC	SPR	B	4	X TERMINAL	X TERMINAL, NCD HMX Pro, 16 MB RAM	0.5	Vendor pred.
NSIDC	WKS	B	1	WKS HOST	SGI Challenge L, 6 CPUs, 512 MB RAM, 12 GB	1.5	Vendor pred.
NSIDC	WKS	B	1	ARCHIVE ROBOTICS	ABBA/E ATL	1.0	Vendor pred.
NSIDC	WKS	B	2	LIBRARY DRIVES	3590 DRIVES	1.0	Vendor pred.
NSIDC	CSS	B	1	CSS SERVER	HP J210/2, 384 MB RAM, 4 GB	2.5	Vendor pred.
NSIDC	MSS	B	1	MSS SERVER	HP J210/2, 384 MB, 4 GB	2.5	Vendor pred.
NSIDC	MSS	B	1	RAID	HP 36 GB RAID	0.5	Vendor pred.

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SDPS AND CSMS COTS Hardware RMA Data For Release B (7 of 19)

Site	HWCI	Rel.	Qty	Item Description	Model	MTTR (Hours)	Data Source
NSIDC	MSS	B	1	MSS BACKUP SERVER	SUN Ultra 4-slot, 256 MB RAM, 4 GB	0.5	Vendor pred.
NSIDC	MSS	B	1	TAPE STACKER	DLT Stacker	0.5	Vendor pred.
NSIDC	MSS	B	2	MSS WS	SUN Ultra 140, 128MB, 4GB	0.5	Vendor pred.
NSIDC	MSS	B	1	LASER PRINTER	HP LaserJet 4M +, 12ppm, 14MB RAM	1.5	Vendor pred.
NSIDC	ISS	B	10	FDDI CONCENTRATOR	FDDI Concentrator - Bay Networks 2914-04	0.5	Vendor pred.
NSIDC	ISS	B	1	FDDI SWITCH	PowerHub7000 - ALANTEC	0.5	Vendor pred.
NSIDC	ISS	B	1	ETHERNET HUB	Ethernet Hub - Cabletron	0.5	Vendor pred.
NSIDC	ISS	B	1	ETHERNET ROUTER	Ethernet Router	0.5	Vendor pred.
EDC	ACM	B	2	APC SERVER	SGI PC XL, 12 CPU, 1 GB RAM, 6 GB	1.5	Vendor pred.
EDC	ACM	B	2	RAID DISK	360 GB	0.5	Vendor pred.
EDC	ACM	B	1	TAPE LIBRARY	STK Powderhorn	1.0	Vendor pred.
EDC	ACM	B	12	LIBRARY DRIVES	3490 Tape Drives	0.5	Vendor pred.
EDC	ACM	B	2	Ops Workstation	Sun Ultra 140, 64 MB RAM, 4 GB	0.5	Vendor pred.
EDC	AQA	B	1	QA CLIENT	SGI Indigo2 Impact, 128 MB RAM, 4 GB	1.0	Vendor pred.
EDC	AQA	B	1	RAID DISK	17 GB	0.5	Vendor pred.
EDC	AIT	B	1	AIT/Sybase Server	Sun Sparc 20/50, 128 MB RAM, 6 GB	0.5	Vendor pred.
EDC	AIT	B	1	DISK	4 GB	0.5	Vendor pred.
EDC	AIT	B	2	X TERMINAL	X TERMINAL, NCD HMX Pro, 16 MB RAM	0.5	Vendor pred.
EDC	AIT	B	2	PRINTER	HP LaserJet 4M+, 12ppm, 14 MB	1.5	Vendor pred.
EDC	DIP	B	2	DISTRIBUTION SERVER	SUN Ultra 4-slot, 2 CPU, 256 MB RAM, 4 GB	0.5	Vendor pred.

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Site	HWCI	Rel.	Qty	Item Description	Model	MTTR (Hours)	Data Source
EDC	DIP	B	2	RAID DISK	608 GB	0.5	Vendor pred.
EDC	DIP	B	1	TAPE STACKER	3, 4mm Drives w/stacker - Exabyte	0.5	Vendor pred.
EDC	DIP	B	3	CD ROM	CD ROM, Recordable, JVC	0.5	Vendor pred.
EDC	DIP	B	1	FAX/SCANNER	FAX/SCANNER	0.5	Vendor pred.
EDC	DIP	B	1	TAPE DRIVE	3480/3490 TAPE DRIVE	0.5	Vendor pred.
EDC	DMG	B	1	DMG SERVER	K400, (redundant CPU & power supplies)	2.7	Vendor pred.
EDC	DMG	B	1	RAID DISK	HP 10 GB	0.5	Vendor pred.
EDC	DMG	B	1	DBA OPS WORKSTATION	HP C100, 64 MB RAM, 6 GB	2.5	Vendor pred.
EDC	DMG	B	2	DATA SPECIALIST WORKSTATION	SUN Ultra 140, 64 MB RAM, 6 GB	0.5	Vendor pred.
EDC	DRP	B	2	FSMS SERVER	SGI PC XL, 6 CPU, 512 MB RAM, 6 GB	1.5	Vendor pred.
EDC	DRP	B	1	RAID DISK	17 GB	0.5	Vendor pred.
EDC	DRP	B	1	RAID DISK	34 GB	0.5	Vendor pred.
EDC	DRP	B	3	ARCHIVE ROBOTICS	STK Powderhorn	1.0	Vendor pred.
EDC	DRP	B	48	TAPE DRIVE	3590 Tape Drive (16 each per archive robotics)	0.5	Vendor pred.
EDC	DRP	B	2	DBMS SERVER	SGI PC XL, 2 CPU, 256 MB RAM, 4 GB	1.5	Vendor pred.
EDC	DRP	B	1	RAID DISK	17 GB	0.5	Vendor pred.
EDC	DDS	B	2	DOCUMENT SERVER	SUN Ultra 4-slot, 256MB, 8 GB	0.5	Vendor pred.
EDC	ICL	B	1	INGEST SERVER	SGI Indigo2, 2 CPU, 256MB RAM, 6GB	1.0	Vendor pred.
EDC	ICL	B	2	8MM TP STACKER W/3 DR	8mm Drive w/stacker - EXABYTE 210	0.3	Vendor pred.
EDC	ICL	B	2	INGEST SERV	SGI Indigo2, 2 CPU, 256MB RAM, 6GB	1.0	Vendor pred.

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SDPS AND CSMS COTS Hardware RMA Data For Release B (9 of 19)

Site	HWCI	Rel.	Qty	Item Description	Model	MTTR (Hours)	Data Source
EDC	ICL	B	1	RAID	SGI RAID	0.5	Vendor pred.
EDC	PLAN	B	1	PDPS DBMS SERVER	SUN Ultra 8-slot, 4 CPUs, 512 MB RAM, 6 GB	0.5	Vendor pred.
EDC	PLAN	B	2	DISK	Sparcstorage Multipack 10.5 GB (2 per server)	0.5	Vendor pred.
EDC	PLAN	B	2	PROD PLANNING/MGMT W/S	SUN Sparc 20/71, 512 MB RAM, 6 GB	0.8	Vendor pred.
EDC	SPR	B	1	SCIENCE PROCESSOR	SGI PC XL, 10 CPU, 1 GB RAM, 4 GB, HiPPI, 4mm	1.5	Vendor pred.
EDC	SPR	B	2	RAID DISK	SGI 288 GB	0.5	Vendor pred.
EDC	SPR	B	1	TAPE STACKER	3, 8mm Drives w/stacker - Exabyte	0.3	Vendor pred.
EDC	SPR	B	6	X TERMINAL	X TERMINAL, NCD HMX Pro, 16 MB RAM	0.5	Vendor pred.
EDC	SPR	B	2	SCIENCE PROCESSOR	SGI PC XL, 10 CPU, 1 GB RAM, 9 GB	1.5	Vendor pred.
EDC	SPR	B	2	RAID	SGI 288 GB	0.5	Vendor pred.
EDC	SPR	B	1	SCIENCE PROCESSOR	SGI PC XL, 6 CPU, 1 GB RAM, 8 GB	1.5	Vendor pred.
EDC	SPR	B	1	RAID	SGI 72 GB	0.5	Vendor pred.
EDC	SPR	B	1	QUEUING SERVER	SUN Ultra 8-slot, 4 CPUs, 512 MB RAM, 4 GB	0.5	Vendor pred.
EDC	SPR	B	2	DISK	Sparcstorage Multipack 10.5 GB (2 per server)	0.5	Vendor pred.
EDC	WKS	B	3	WKSHW HOST	SGI PC XL, 6 CPU, 512 MB RAM, 6[GB	1.5	Vendor pred.
EDC	WKS	B	3	RAID DISK	SGI 34 GB	0.5	Vendor pred.
EDC	WKS	B	1	WKSHW HOST	SGI PC XL, 8 CPU, 512 MB RAM, 6[GB	1.5	Vendor pred.
EDC	WKS	B	1	RAID DISK	SGI 68 GB	0.5	Vendor pred.
EDC	WKS	B	1	TAPE LIBRARY	STK Powderhorn	1.0	Vendor pred.
EDC	WKS	B	32	LIBRARY DRIVES	D3 TAPE DRIVES	0.5	Vendor pred.

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Site	HWCI	Rel.	Qty	Item Description	Model	MTTR (Hours)	Data Source
EDC	CSS	B	1	CSS SERVER	HP J210/2, 384 MB, 4 GB	2.5	Vendor pred.
EDC	MSS	B	1	MSS SERVER	HP J210/2, 384 MB, 4 GB	2.5	Vendor pred.
EDC	MSS	B	1	RAID	HP 48 GB RAID	0.5	Vendor pred.
EDC	MSS	B	1	MSS BACKUP SERVER	SUN Ultra 4-slot, 256 MB RAM, 4 GB	0.5	Vendor pred.
EDC	MSS	B	1	TAPE STACKER	DLT Stacker	0.5	Vendor pred.
EDC	MSS	B	1	MSS WS	SUN Sparcstation 20/50, 128 MB, 6 GB	0.5	Vendor pred.
EDC	MSS	B	1	MSS WS	SUN Ultra 140, 128 MB RAM, 4GB	0.5	Vendor pred.
EDC	MSS	B	1	MSS WS	SUN Sparc 20/712	1.0	Vendor pred.
EDC	MSS	B	2	LASER PRINTER	HP LaserJet 4M +, 12ppm, 14MB RAM	1.5	Vendor pred.
EDC	ISS	B	10	FDDI CONCENTRATOR	FDDI Concentrator - Bay Networks 2914-04	0.5	Vendor pred.
EDC	ISS	B	1	FDDI SWITCH	PowerHub7000 - ALANTEC (4 FDDI cards & 3 power supplies)	0.5	Vendor pred.
EDC	ISS	B	1	ETHERNET HUB	Ethernet Hub - Cabletron MicroMAC-22E w/BRIM-F6	0.5	Vendor pred.
EDC	ISS	B	1	HPPI SWITCH	HPPI SWITCH	0.5	Vendor pred.
EDC	ISS	B	1	FIDDI ROUTER	FIDDI ROUTER	0.5	Vendor pred.
GSFC	ACM	B	2	APC SERVER	SGI Challenge L, 4 CPU, 256 MB RAM, 4 GB	1.5	Vendor pred.
GSFC	ACM	B	1	RAID DISK	460 GB	0.5	Vendor pred.
GSFC	ACM	B	1	TAPE LIBRARY	STK Wolfcreek ATL	1.0	Vendor pred.
GSFC	ACM	B	8	LIBRARY DRIVES	D3 Tape Drives	0.5	Vendor pred.
GSFC	ACM	B	2	Ops Workstation	Sun Sparc 20/50, 64 MB RAM, 2 GB	0.5	Vendor pred.
GSFC	AQA	B	1	QA WORKSTATION	SGI Indigo2 XZ, 256 MB RAM, 10 GB	1.0	Vendor pred.

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GSFC	AIT	B	1	AIT WORKSTATION	Sun Sparc 20/712	1.0	Vendor pred.
GSFC	AIT	B	3	AIT WORKSTATION	Sun Sparc 20/50	0.5	Vendor pred.
GSFC	AIT	B	2	PRINTER	HP LaserJet 4M+, 12ppm, 14 MB	1.5	Vendor pred.
GSFC	DIP	B	3	DISTRIBUTION SERVER	SUN Sparc 20/712, 256 MB RAM, 6 GB	1.0	Vendor pred.
GSFC	DIP	B	1	RAID DISK	240 GB	0.5	Vendor pred.
GSFC	DIP	B	1	TAPE STACKER	3, 8mm Drives w/stacker - Exabyte	0.3	Vendor pred.
GSFC	DIP	B	1	TAPE STACKER	3, 4mm Drives w/stacker - Exabyte	0.5	Vendor pred.
GSFC	DIP	B	1	CD ROM	CD ROM, Recordable, JVC	0.5	Vendor pred.
GSFC	DIP	B	1	FAX/SCANNER	FAX/SCANNER	0.5	Vendor pred.
GSFC	DIP	B	1	TAPE DRIVE	3480/3490 TAPE DRIVE	0.5	Vendor pred.
GSFC	DIP	B	1	TAPE DRIVE	6250 BPI Tape Drive	1.0	Vendor pred.
GSFC	DIP	B	2	PRINTER	HP LaserJet 4M+, 12 ppm, 14 MB	1.5	Vendor pred.
GSFC	DMG	B	1	DMG SERVER	K400, (redundant CPU & pwer supplies)	2.7	Vendor pred.
GSFC	DMG	B	1	RAID DISK	HP 10 GB	0.5	Vendor pred.
GSFC	DMG	B	3	DATA SPECIALIST WORKSTATION	SUN Sparc 20/50, 64 MB RAM, 4 GB	0.5	Vendor pred.
GSFC	DMG	B	1	DBA OPS WORKSTATION	HP 715/64, 64 MB RAM, 6 GB, 8mm	1.0	Vendor pred.
GSFC	DRP	B	2	FSMS SERVER	SGI Challenge XL, 4 CPU, 512 MB RAM, 6 GB	1.5	Vendor pred.
GSFC	DRP	B	1	RAID DISK	68 GB	0.5	Vendor pred.
GSFC	DRP	B	2	ARCHIVE ROBOTICS	EMASS AML, Model 2, Tall Quadro Tower, 2 Arms)	1.0	Vendor pred.
GSFC	DRP	B	20	TAPE DRIVE	3590 Tape Drive (10 each per archive robotics)	1.0	Vendor pred.
GSFC	DRP	B	2	DBMS SERVER	SGI Challenge XL, 2 CPU, 256 MB RAM, 6 GB	1.5	Vendor pred.

SDPS AND CSMS COTS Hardware RMA Data For Release B (12 of 19)

Site	HWCI	Rel.	Qty	Item Description	Model	MTTR (Hours)	Data Source
GSFC	DRP	B	1	RAID DISK	10 GB	0.5	Vendor pred.
GSFC	DDS	B	2	DOCUMENT SERVER	SUN Sparcstation 20/712, 256MB, 6GB	1.0	Vendor pred.
GSFC	ICL	B	1	RAID	SGI 100 GB RAID	0.5	Vendor pred.
GSFC	ICL	B	2	8MM TP STACKER W/3 DR	8mm Drive w/stacker - EXABYTE 210	0.3	Vendor pred.
GSFC	ICL	B	2	INGEST SERVER	SGI Challenge L, 4 CPU, 256MB, 6GB,FDDI	1.5	Vendor pred.
GSFC	ICL	B	1	X TERMINAL	X TERMINAL (NCD)	0.5	Vendor pred.
GSFC	ICL	B	1	ARCHIVE ROBOTICS	ARCHIVE ROBOTICS - 1 Tower, 1 Arm	1.0	Vendor pred.
GSFC	ICL	B	2	LINEAR MAG DR	NTP Linear Tape Drive, 3590	1.0	Vendor pred.
GSFC	PLAN	B	1	PDPS DBMS SERVER	SUN Ultra 8-slot, 4 CPUs, 512 MB RAM, 6 GB	0.5	Vendor pred.
GSFC	PLAN	B	2	DISK	Sparcstorage Multipack 10.5 GB (2 per server)	0.5	Vendor pred.
GSFC	PLAN	B	2	PROD PLANNING/MGMT W/S	SUN Sparc 20/71, 512 MB RAM, 6 GB	0.8	Vendor pred.
GSFC	SPR	B	1	SCIENCE PROCESSOR	SGI Power Challenge XL, 8 CPU, 2 GB RAM, 12 GB, HiPPI	1.5	Vendor pred.
GSFC	SPR	B	2	RAID DISK	SGI 212 GB	0.5	Vendor pred.
GSFC	SPR	B	1	TAPE STACKER	3, 8mm Drives w/stacker - Exabyte	0.3	Vendor pred.
GSFC	SPR	B	9	X TERMINAL	X TERMINAL, NCD HMX Pro, 16 MB RAM	0.5	Vendor pred.
GSFC	SPR	B	1	SCIENCE PROCESSOR	SGI Power Challenge XL, 16 CPU, 2 GB RAM, 18 GB, HiPPI	1.5	Vendor pred.
GSFC	SPR	B	1	RAID	SGI 212 GB	0.5	Vendor pred.
GSFC	SPR	B	1	SCIENCE PROCESSOR	SGI Power Challenge XL, 16 CPU, 2 GB RAM, 18 GB, HiPPI	1.5	Vendor pred.
GSFC	SPR	B	1	RAID	SGI 212 GB	0.5	Vendor pred.
GSFC	SPR	B	1	SCIENCE PROCESSOR	SGI Challenge DM, 2 CPU, 256 MB RAM, 2 GB	1.5	Vendor pred.

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SDPS AND CSMS COTS Hardware RMA Data For Release B (13 of 19)

Site	HWCI	Rel.	Qty	Item Description	Model	MTTR (Hours)	Data Source
GSFC	SPR	B	1	RAID	68 GB	0.5	Vendor pred.
GSFC	SPR	B	1	SCIENCE PROCESSOR	SGI Indy, 256 MB RAM, 4 GB	1.5	Vendor pred.
GSFC	SPR	B	1	8MM TP STACKER W/3 DR	8mm Drive w/stacker - EXABYTE 210	0.3	Vendor pred.
GSFC	SPR	B	1	SCIENCE PROCESSOR	SGI Indy, 256 MB RAM, 6 GB	1.5	Vendor pred.
GSFC	SPR	B	1	QUEUING SERVER	SUN Ultra 8-slot, 4 CPUs, 512 MB RAM, 6 GB	0.5	Vendor pred.
GSFC	SPR	B	2	DISK	Sparcstorage Multipack 10.5 GB (2 per server)	0.5	Vendor pred.
GSFC	WKS	B	2	WKSHW HOST	SGI Challenge L, 4 CPU, 256 MB RAM, 4 GB	1.5	Vendor pred.
GSFC	WKS	B	1	RAID DISK	SGI 340 GB	0.5	Vendor pred.
GSFC	WKS	B	1	TAPE LIBRARY	STK Wolfcreek ATL	1.0	Vendor pred.
GSFC	WKS	B	6	LIBRARY DRIVES	D3 TAPE DRIVES	0.5	Vendor pred.
GSFC	CSS	B	1	CSS SERVER	HP J210/1, 256 MB, 4 GB	2.5	Vendor pred.
GSFC	MSS	B	1	MSS SERVER	HP J210/1, 256 MB, 4 GB	2.5	Vendor pred.
GSFC	MSS	B	1	RAID	HP 108 GB RAID	0.5	Vendor pred.
GSFC	MSS	B	1	MSS BACKUP SERVER	SUN Ultra 4-slot, 256 MB RAM, 4 GB	0.5	Vendor pred.
GSFC	MSS	B	1	TAPE STACKER	DLT Stacker	0.5	Vendor pred.
GSFC	MSS	B	1	MSS WS	SUN Sparcstation 20/50, 128MB, 8GB	0.5	Vendor pred.
GSFC	MSS	B	1	MSS WS	SUN Sparcstation 20/50, 128MB, 4GB	0.5	Vendor pred.
GSFC	MSS	B	1	LASER PRINTER	HP LaserJet 4M +, 12ppm, 14MB RAM	1.5	Vendor pred.
GSFC	ISS	B	12	FDDI CONCENTRATOR	FDDI Concentrator - Bay Networks 2914-04	0.5	Vendor pred.
GSFC	ISS	B	1	FDDI SWITCH	PowerHub7000 - ALANTEC (4 FDDI cards & 3 power supplies)	0.5	Vendor pred.

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SDPS AND CSMS COTS Hardware RMA Data For Release B (14 of 19)

Site	HWCI	Rel.	Qty	Item Description	Model	MTTR (Hours)	Data Source
GSFC	ISS	B	1	ETHERNET HUB	Ethernet Hub - Cabletron MicroMAC-22E w/BRIM-F6	0.5	Vendor pred.
GSFC	ISS	B	1	HPPI SWITCH	HPPI SWITCH	0.5	Vendor pred.
GSFC	ISS	B	1	FIDDI ROUTER	FIDDI ROUTER	0.5	Vendor pred.
ORNL	ACM	B	2	APC SERVER	SGI PC XL, 6 CPU, 512 MB RAM, 6 GB	1.5	Vendor pred.
ORNL	ACM	B	1	RAID DISK	161 GB	0.5	Vendor pred.
ORNL	ACM	B	2	OPS WORKSTATION	Sun Sparc 20/50, 64 MB RAM, 4 GB	0.5	Vendor pred.
ORNL	DMG	B	1	DMG SERVER	K400, (redundant CPU & power supplies)	2.7	Vendor pred.
ORNL	DMG	B	1	RAID DISK	HP 10 GB	0.5	Vendor pred.
ORNL	DMG	B	1	DBA OPS WORKSTATION	HP C100, 64 MB RAM, 6 GB	2.5	Vendor pred.
ORNL	DMG	B	2	DATA SPECIALIST WORKSTATION	SUN Ultra 140, 64 MB RAM, 6 GB	0.5	Vendor pred.
ORNL	DRP	B	2	DBMS SERVER	SGI PC XL, 2 CPU, 256 MB RAM, 4 GB	1.5	Vendor pred.
ORNL	DRP	B	1	RAID DISK	17 GB	0.5	Vendor pred.
ORNL	DDS	B	2	DOCUMENT SERVER	SUN Sparcstation 20/712, 256MB, 8 GB	1.0	Vendor pred.
ORNL	DDS	B	1	RAID DISK	10 GB	0.5	Vendor pred.
ORNL	CSS	B	1	CSS SERVER	HP J210/2, 384 MB, 4 GB	2.5	Vendor pred.
ORNL	MSS	B	1	MSS SERVER	HP J210/2, 384 MB, 4 GB	2.5	Vendor pred.
ORNL	MSS	B	1	RAID	HP 28 GB RAID	0.5	Vendor pred.
ORNL	MSS	B	1	MSS BACKUP SERVER	SUN Ultra 4-slot, 256 MB RAM, 4 GB	0.5	Vendor pred.
ORNL	MSS	B	1	TAPE STACKER	DLT Stacker	0.5	Vendor pred.
ORNL	MSS	B	1	MSS WS	SUN Ultra 140, 128 MB RAM, 4 GB	0.5	Vendor pred.

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Site	HWCI	Rel.	Qty	Item Description	Model	MTTR (Hours)	Data Source
ORNL	MSS	B	1	MSS WS	SUN Ultra 140, 128 MB RAM, 8 GB	0.5	Vendor pred.
ORNL	MSS	B	1	LASER PRINTER	HP LaserJet 4M +, 12ppm, 14MB RAM	1.5	Vendor pred.
ORNL	ISS	B	1	ETHERNET SWITCH/ROUTER	Ethernet Switch/Router	0.5	Vendor pred.
ASF	ACM	B	2	APC SERVER	SGI Challenge XL, 6 CPU, 512 MB RAM, 6 GB	1.5	Vendor pred.
ASF	ACM	B	1	RAID DISK	288 GB	0.5	Vendor pred.
ASF	ACM	B	2	OPS WORKSTATION	SUN Ultra 140, 64 MB RAM, 4 GB	0.5	Vendor pred.
ASF	DMG	B	1	DMG SERVER	K400, (redundant CPU & power supplies)	2.7	Vendor pred.
ASF	DMG	B	1	RAID DISK	HP 10 GB	0.5	Vendor pred.
ASF	DMG	B	1	DBA OPS WORKSTATION	HP C100, 64 MB RAM, 6 GB	2.5	Vendor pred.
ASF	DMG	B	2	DATA SPECIALIST WORKSTATION	SUN Ultra 140, 64 MB RAM, 6 GB	0.5	Vendor pred.
ASF	DIP	B	2	DISTRIBUTION SERVER	SUN Ultra 4-slot, 2 CPU, 256 MB RAM, 6 GB	0.5	Vendor pred.
ASF	DIP	B	1	RAID DISK	74 GB	0.5	Vendor pred.
ASF	DIP	B	1	TAPE STACKER	3, 8mm Drives w/stacker - Exabyte	0.3	Vendor pred.
ASF	DIP	B	1	TAPE STACKER	3, 4mm Drives w/stacker - Exabyte	0.5	Vendor pred.
ASF	DIP	B	1	TAPE DRIVE	6250 BPI Tape Drive	1.0	Vendor pred.
ASF	DIP	B	1	CD ROM	CD ROM, Recordable, JVC	0.5	Vendor pred.
ASF	DIP	B	1	FAX/SCANNER	FAX/SCANNER	0.5	Vendor pred.
ASF	DIP	B	1	TAPE DRIVE	3480/3490 TAPE DRIVE	0.5	Vendor pred.
ASF	DIP	B	2	LASER PRINTER	HP LaserJet 4M +, 12ppm, 14MB RAM	1.5	Vendor pred.
ASF	DRP	B	1	FSMS SERVER	SGI Challenge XL, 6 CPU, 512 MB RAM, 8 GB	1.5	Vendor pred.

Site	HWCI	Rel.	Qty	Item Description	Model	MTTR (Hours)	Data Source
ASF	DRP	B	1	ARCHIVE ROBOTICS	EMASS ABBA/E	1.0	Vendor pred.
ASF	DRP	B	4	LIBRARY DRIVES	3590 Tape Drive	1.0	Vendor pred.
ASF	DRP	B	2	DBMS SERVER	SGI Challenge XL, 2 CPU, 256 MB RAM, 8 GB	1.5	Vendor pred.
ASF	DRP	B	1	RAID DISK	17 GB	0.5	Vendor pred.
ASF	DDS	B	2	DOCUMENT SERVER	SUN Ultra 4-slot, 2 CPU, 256 MB RAM, 6 GB	0.5	Vendor pred.
ASF	DDS	B	1	RAID DISK	6 GB	0.5	Vendor pred.
ASF	WKS	B	1	RAID DISK	17 GB	0.5	Vendor pred.
ASF	CSS	B	1	CSS SERVER	HP J210/2, 384 MB, 4 GB	2.5	Vendor pred.
ASF	MSS	B	1	MSS SERVER	HP J210/2, 384 MB, 4 GB	2.5	Vendor pred.
ASF	MSS	B	1	RAID	HP 28 GB RAID	0.5	Vendor pred.
ASF	MSS	B	1	MSS BACKUP SERVER	SUN Ultra 4-slot, 256 MB RAM, 4 GB	0.5	Vendor pred.
ASF	MSS	B	1	TAPE STACKER	DLT Stacker	0.5	Vendor pred.
ASF	MSS	B	1	MSS WS	SUN Ultra 140, 128 MB RAM, 4 GB	0.5	Vendor pred.
ASF	MSS	B	1	MSS WS	SUN Ultra 140, 128 MB RAM, 8 GB	0.5	Vendor pred.
ASF	MSS	B	1	LASER PRINTER	HP LaserJet 4M +, 12ppm, 14MB RAM	1.5	Vendor pred.
ASF	ISS	B	7	FDDI CONCENTRATOR	FDDI Concentrator - Bay Networks 2914-04	0.5	Vendor pred.
ASF	ISS	B	1	FDDI SWITCH	PowerHub7000 - ALANTEC (4 FDDI cards & 3 power supplies)	0.5	Vendor pred.
ASF	ISS	B	1	ETHERNET HUB	Ethernet Hub - Cabletron MicroMAC-22E w/BRIM-F6	0.5	Vendor pred.
ASF	ISS	B	1	FIDDI ROUTER	FIDDI ROUTER	0.5	Vendor pred.
JPL	ACM	B	2	APC SERVER	SGI Challenge L, 8 CPU, 256 MB RAM, 4 GB	1.5	Vendor pred.

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Site	HWCI	Rel.	Qty	Item Description	Model	MTTR (Hours)	Data Source
JPL	ACM	B	1	RAID DISK	68 GB	0.5	Vendor pred.
JPL	ACM	B	1	TAPE LIBRARY	STK Wolfcreek ATL	1.0	Vendor pred.
JPL	ACM	B	2	LIBRARY DRIVES	3490 Tape Drive	0.5	Vendor pred.
JPL	ACM	B	2	OPS WORKSTATION	SUN Ultra 140, 64 MB RAM, 4 GB	0.5	Vendor pred.
JPL	AITHW	B	4	X TERMINAL	X TERMINAL, NCD HMX Pro, 16 MB RAM	0.5	Vendor pred.
JPL	AITHW	B	1	PRINTER	HP LaserJet 4M+, 12ppm, 14 MB	1.5	Vendor pred.
JPL	DIP	B	2	DISTRIBUTION SERVER	SUN Ultra 4-slot, 2 CPU, 256 MB RAM, 6 GB	0.5	Vendor pred.
JPL	DIP	B	1	RAID DISK	12 GB	0.5	Vendor pred.
JPL	DIP	B	1	TAPE STACKER	3, 8mm Drives w/stacker - Exabyte	0.3	Vendor pred.
JPL	DIP	B	1	TAPE STACKER	3, 4mm Drives w/stacker - Exabyte	0.5	Vendor pred.
JPL	DIP	B	1	TAPE DRIVE	6250 BPI Tape Drive	1.0	Vendor pred.
JPL	DIP	B	1	CD ROM	CD ROM, Recordable, JVC	0.5	Vendor pred.
JPL	DIP	B	1	FAX/SCANNER	FAX/SCANNER	0.5	Vendor pred.
JPL	DIP	B	1	TAPE DRIVE	3480/3490 TAPE DRIVE	0.5	Vendor pred.
JPL	DMG	B	1	DMG SERVER	K400, (redundant CPU & power supplies)	2.7	Vendor pred.
JPL	DMG	B	1	RAID DISK	HP 10 GB	0.5	Vendor pred.
JPL	DMG	B	1	DBA OPS WORKSTATION	HP C100, 64 MB RAM, 6 GB	2.5	Vendor pred.
JPL	DMG	B	2	DATA SPECIALIST WORKSTATION	SUN Ultra 140, 64 MB RAM, 6 GB	0.5	Vendor pred.
JPL	DRP	B	1	FSMS SERVER	SGI Challenge L, 4 CPU, 256 MB RAM, 10 GB	1.5	Vendor pred.
JPL	DRP	B	1	ARCHIVE ROBOTICS	ABBA/E ATL	1.0	Vendor pred.

Site	HWCI	Rel.	Qty	Item Description	Model	MTTR (Hours)	Data Source
JPL	DRP	B	4	LIBRARY DRIVES	D3 Tape Drive	0.5	Vendor pred.
JPL	DRP	B	2	DBMS SERVER	SGI Challenge XL, 2 CPU, 256 MB RAM, 10 GB	1.5	Vendor pred.
JPL	DRP	B	1	RAID DISK	17 GB	0.5	Vendor pred.
JPL	DDS	B	2	DOCUMENT SERVER	SUN Ultra 140, 2 CPU, 256 MB RAM, 6 GB	0.5	Vendor pred.
JPL	DDS	B	1	RAID DISK	6 GB	0.5	Vendor pred.
JPL	ICL	B	2	INGEST SERVER	SGI Challenge L, 4 CPU, 256MB, 6GB,FDDI	1.5	Vendor pred.
JPL	ICL	B	1	RAID	SGI 102 GB RAID	0.5	Vendor pred.
JPL	ICL	B	2	8MM TP STACKER W/3 DR	8mm Drive w/stacker - EXABYTE 210	0.3	Vendor pred.
JPL	ICL	B	1	ARCHIVE ROBOTICS	ARCHIVE ROBOTICS - 1 Tower, 1 Arm	1.0	Vendor pred.
JPL	ICL	B	2	LINEAR MAG DR	NTP Linear Tape Drive, 3590	1.0	Vendor pred.
JPL	ICL	B	1	X TERMINAL	X TERMINAL, NCD HMX Pro, 16 MB RAM	0.5	Vendor pred.
JPL	PLAN	B	2	PDPS DBMS SERVER	SUN Sparc 20/712, 512 MB RAM, 4 GB	1.0	Vendor pred.
JPL	PLAN	B	4	DISK	Sparcstorage Multipack 6.3 GB (2 each per server)	0.5	Vendor pred.
JPL	SPR	B	1	AIT & AQA PROCESSOR	SGI Indigo2 Impact, 128 MB RAM, 4 GB	1.0	Vendor pred.
JPL	SPR	B	1	RAID DISK	17 GB	0.5	Vendor pred.
JPL	SPR	B	2	SCIENCE PROCESSOR	SGI Challenge L, 4 CPU, 512MB, 4GB	1.5	Vendor pred.
JPL	SPR	B	1	TAPE STACKER	3, 8mm Drives w/stacker - Exabyte	0.3	Vendor pred.
JPL	SPR	B	2	X TERMINAL	X TERMINAL, NCD HMX Pro, 16 MB RAM	0.5	Vendor pred.
JPL	SPR	B	2	QUEUING SERVER	SUN Sparc 20/712, 512 MB RAM, 4 GB	1.0	Vendor pred.
JPL	SPR	B	4	DISK	Sparcstorage Multipack 6.3 GB (2 each per server)	0.5	Vendor pred.

SDPS AND CSMS COTS Hardware RMA Data For Release B (19 of 19)

Site	HWCI	Rel.	Qty	Item Description	Model	MTTR (Hours)	Data Source
JPL	WKS	B	1	WKS HOST	SGI Challenge L, 6 CPU, 512 MB RAM, 6 GB	1.5	Vendor pred.
JPL	WKS	B	1	RAID DISK	SGI 17 GB	0.5	Vendor pred.
JPL	CSS	B	1	CSS SERVER	HP J210/2, 384 MB, 4 GB	2.5	Vendor pred.
JPL	MSS	B	1	MSS SERVER	HP J210/2, 384 MB, 4 GB	2.5	Vendor pred.
JPL	MSS	B	1	RAID	HP 28 GB RAID	0.5	Vendor pred.
JPL	MSS	B	1	MSS BACKUP SERVER	SUN Ultra 4-slot, 256 MB RAM, 4 GB	0.5	Vendor pred.
JPL	MSS	B	1	TAPE STACKER	DLT Stacker	0.5	Vendor pred.
JPL	MSS	B	1	MSS WS	SUN Ultra 140, 128 MB RAM, 4 GB	0.5	Vendor pred.
JPL	MSS	B	1	MSS WS	SUN Ultra 140, 128 MB RAM, 8 GB	0.5	Vendor pred.
JPL	MSS	B	1	LASER PRINTER	HP LaserJet 4M +, 12ppm, 14MB RAM	1.5	Vendor pred.
JPL	ISS	B	11	FDDI CONCENTRATOR	FDDI Concentrator - Bay Networks 2914-04	0.5	Vendor pred.
JPL	ISS	B	1	FDDI SWITCH	PowerHub7000 - ALANTEC (4 FDDI cards & 3 power supplies)	0.5	Vendor pred.
JPL	ISS	B	1	ETHERNET HUB	Ethernet Hub - Cabletron MicroMAC-22E w/BRIM-F6	0.5	Vendor pred.
JPL	ISS	B	1	ETHERNET SWITCH/ROUTER	Ethernet Switch/Router	0.5	Vendor pred.

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Abbreviations and Acronyms

ACMHW   Access and Control Management Hardware CI (ACM)

AITHW   Algorithm Integration and Test Hardware CI

ALDT   Administrative Logistics Delay Time

ATL   Automated Tape Library

AQAHW   Algorithm Quality Assurance Hardware CI

ASF   Alaska SAR Facility

CCR   Configuration Change Request

CDR   Critical Design Review

CDRL   Contract Data Requirements List

CI   Configuration Item

CN   Change Notice

COTS   Commercial Off The Shelf

CSMS   Communications and Systems Management Segment (ECS)

CSS   Communication Subsystem

DAAC   Distributed Active Archive Center

DCN   Document Change Notice

DID   Data Item Description

DIPHW   Distribution and Ingest Peripheral Hardware CI (DIP)

DMGHW   Data Management Server Hardware CI (DMG)

DRPHW   Data Repository Hardware CI (DRP)

ECS   EODIS Core System

EDC   EROS Data Center (DAAC)

EDS   Electronic Data Systems

EOC   EOS Operations Center (ECS)

EOC-SRV   EOS Operations Center (ECS) Server

EOC-WS   EOS Operations Center (ECS) Workstation

EOC-T-SRV   EOS Operations Center (ECS) Timing Server

EOC-RAID   Earth Observing Center RAID

EOS	Earth Observing System
EOSDIS	Earth Observing System Data and Information System
EPL	Engineering Parts List
EROS	Earth Resources Observation System
ESDIS	Earth Science Data and Information System (GSFC)
FPMH	Failure Per Million Hours
FOS	Flight Operations Segment (ECS)
GFE	Government Furnished Equipment
GSFC	Goddard Space Flight Center
ICLHW	Ingest Client Hardware CI (ICL)
IDR	Incremental Design Review
ILS	Integrated Logistics Support
ISS	Internetworking Subsystem
JPL	Jet Propulsion Laboratory
LaRC	Langley Research Center (DAAC)
LRU	Line Replaceable Unit
MDT	Mean Down Time
MTBF	Mean Time Between Failure
MTTR	Mean Time To Repair
MSS	Management Subsystem
NASA	National Aeronautics and Space Administration
NPRD	Nonelectronic Parts Reliability Data
NSIDC	National Snow and Ice Data Center
ORNL	Oak Ridge National Laboratory
PAIP	Performance Assurance Implementation Plan
PDR	Preliminary Design Review
PLNHW	Planning Hardware CI (PLAN)
RAID	Redundant Array of Independent Disks
RMA	Reliability, Maintainability, Availability
SDPS	Science Data Processing Segment (ECS)
SMC	System Management Center (ECS)

SPRHW   Science Processing Hardware CI (SPR)

VCATS   Vendor pred. Costing And Tracking System (ECS)

WKSHW   Working Storage Hardware CI (WKS)